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Testimony Presented by
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Chairman Rogers, Ranking Member Cooper and Members of the Subcommittee. Thank you for the opportunity to appear today to discuss how Orbital ATK is supporting United States national security space systems and launch vehicle programs.

## Introduction

As a global leader in aerospace and defense technologies, Orbital ATK designs, builds and delivers affordable space, defense, and aviation-related systems to support our nation's warfighters as well as civil government and commercial customers in the U.S. and abroad. Our company is the leading provider of small- and medium-class space launch vehicles for civil, military, and commercial missions, having conducted more than 80 launches of such vehicles for NASA, the U.S. Air Force, the Missile Defense Agency (MDA), and other government, commercial and international customers in the last 25 years. We are also a major supplier of interceptor and target vehicles for missile defense applications, with over 200 such vehicles built in the last 20 years. The company is, in addition, the world's largest producer of solid rocket propulsion systems, having developed and manufactured over 16,000 solid rocket motors for strategic, tactical, and space applications over the last 50 years. We are proud of our past work in designing and building these launch vehicles and propulsion systems, and we are working today to continue developing cutting-edge launch capabilities that will support our nation's space goals for decades to come.

## The Air Force's RPS Program

Earlier this year, the U.S. Air Force announced its EELV Phase 2 development and launch services acquisition plan. One of the initial components of this plan, beginning in FY 2015, centers on the Rocket Propulsion System (RPS) Prototype Program. We believe the Air Force's

acquisition plan for RPS is well-conceived and, if supported by Congress, will be successful in providing new space launch capabilities that are affordable, reliable, and available by the end of this decade.

We strongly endorse four important principles that underpin the RPS program:

- The Air Force should enter into contracts with several launch vehicle builders who in turn would be responsible for selecting and managing propulsion system suppliers, to minimize the probability that a propulsion system would be developed that is not appropriate for vehicle operators.
- New propulsion systems developed with Air Force funds should be available on a non-discriminatory basis to all U.S. launch vehicle companies and, where feasible, should support multiple end-use applications, to potentially include strategic missiles, missile defense and human space flight as well as space launch of satellites.
- New launch vehicles and their propulsion systems supported by the Air Force should be developed in public/private partnerships with a shared investment by both the Government and Industry, in order to provide the proper incentives for highly affordable and commercially competitive vehicles and systems to be produced.
- New launch vehicles and their propulsion systems supported by the Air Force should have a high probability of conducting initial launches before 2020 and of being fully certified two years thereafter.

As both a launch vehicle builder and a propulsion system supplier, Orbital ATK is uniquely positioned to support the Air Force RPS Prototype Program. Orbital ATK has proposed both solid and liquid propulsion developments that will support a new all-American launch vehicle family that meets all the specified national security launch requirements as well as civil government, commercial and international launch needs. Our new systems will be developed in a public/private partnership with significant private investment supplementing government funding. We are confident that our alternatives will be ready to support first flights by early 2019. For our vehicles and propulsion systems, we will combine advanced solid rocket motor and liquid engine technologies to create a modular family of highly affordable and commercially

competitive launch vehicles. Beyond their contribution to assured and affordable access to space, these new systems will also strengthen our country's technology base and increase its industrial utilization to benefit the U.S. Navy and Air Force's strategic missile, MDA's missile defense and NASA's human space flight programs as well.

Advanced Solid Rocket Motors

Solid-propellant rocket motors have been used in American space launch vehicles since the dawn of the space age in the late 1950's. In many cases, they have provided the primary propulsion for boost-stage and upper-stage applications, while in others, such as the Space Shuttle, Titan, Delta II and today's EELV Phase 1 they have served as supplemental propulsion along with liquid engine systems. In recent years, major design and manufacturing advances in solid motor case technologies, propellant formulation, insulator materials and other areas have resulted in higher performance, increased reliability, and enhanced affordability. At Orbital ATK, we have incorporated these new technologies in the development of six new solid rocket motors over the past seven years, completing the development of several of the motors in only two years.

As I noted earlier, solid rocket motors are critical components used by strategic missiles, missile defense interceptors, space launch vehicles, and tactical missiles for the Department of Defense, as well as launch vehicles for NASA and other government agencies and commercial customers. For example, at our production facility in Promontory, Utah, Orbital ATK is today building, and has recently successfully tested, the world's largest solid rocket motor for NASA's Space Launch System (SLS) to enable deep-space exploration. We are also on track to meet the Missile Defense Agency's needs through upgrades of solid rocket motors used in support of deployment and testing of the GMD program, ensuring all performance and schedule objectives will be achieved for this essential national defense program. Additionally, our Trident II/D5 fleet ballistic missile motors for the U.S. Navy, now in their 28th year of production, continue to support our nation's strategic deterrence objectives and are scheduled to do so for decades to come.

New Liquid Propulsion Engines

While the United States is the world's undisputed leader in development and production of solid rocket motors, the same cannot be said for our current position related to large liquid rocket engines. Fortunately, this deficiency is now being addressed by several new and innovative liquid propulsion system suppliers. In particular, we are impressed by the progress being made by Blue Origin in its BE-3 and BE-4 liquid hydrogen and methane engine programs which are being developed with private investment. Based on the progress thus far, the BE-3/BE-4 engines have the potential to advance United States liquid rocket engines far ahead of what is currently being produced overseas. And like the solid propulsion technology we are developing internally, we believe the BE engines can be available for operational use by 2019 and will be offered at commercially attractive prices.

In addition, Blue Origin has committed to be a merchant supplier of its liquid engines, making them available to all interested U.S. launch vehicle integrators. As a result, competition among vehicle companies will be promoted and production rates on BE engines will be increased, leading to lower costs for all launch service customers.

In both advanced solid rocket motors and new liquid rocket engines, the establishment of public/private partnerships will significantly reduce both initial and long-term costs to the government. And with a robust competition between two or more launch vehicle providers, there will be strong incentives to drive costs down further. However, if industry is restricted to only designing an engine to replace the RD-180 for the Atlas V, we believe significant delays and cost overruns are likely, rendering the U.S. dependent on a single launch provider for an extended period of time thus adding risk to the nations "assured access to space." This approach would contradict the best practices that have been adopted by Congress, DoD, and industry over many years for developing and manufacturing launch vehicles.

Recommendations

Chairman Rogers and Ranking Member Cooper, I appreciate this Committee's review of U.S. technology options and industrial capability for meeting our country's space launch needs. As the committee continues its deliberations on this important topic, I respectfully offer the

following recommendations:

1. Fully support the Air Force's plans for development of new launch vehicles. The U.S. needs space launch systems that provide assured access to space for defense missions and that are globally competitive. The best launch systems will be developed if the government prescribes its mission requirements and then allows industry to design launch vehicles and to select propulsion systems to meet these requirements. However, if a key part of the launch vehicles, such as a particular main engine type, is prescribed by the government, industry will be severely limited in our abilities to meet these technical objectives with systems that are cost-competitive and available on expedited schedules.

2. Request that DoD conduct an updated assessment of ways that new propulsion systems can support multi-agency needs. Since the U.S. government's total annual investment in launch vehicles and propulsion systems for strategic missiles, missile defense and human space exploration substantially exceeds its funding for national security space launch, important cost synergy should be achievable by considering opportunities for propulsion commonality between different end- users. In particular, consistent with the DoD Solid Rocket Motor Industrial Base Sustainment and Implementation Plan as requested by the FY2010 National Defense Authorization Act, the Congress should continue to require coordination between the Department of Defense and NASA to ensure solid motor industrial base sustainment is considered as part of this Air Force program.

3. Encourage the Air Force to expand its EELV Phase 2 program to include consideration of medium-lift vehicles in addition to intermediate- and heavy-lift launchers. As satellite architectures continue to evolve over the next 25 to 30 years, when these new launch vehicles are operational, many types of space payloads are likely to become lighter and not require heavy launch capabilities. By ensuring the full consideration of medium-lift vehicles in its plans, DoD will provide even stronger incentives to industry to invest in a broader range of launch and propulsion systems and to further drive down launch costs.

4. Work with the Air Force to ensure a thorough but timely new launch vehicle certification process. As Wehrner von Braun once said, "We can lick gravity, but sometimes the paperwork is overwhelming." The certification process for any new launch vehicle will take time and it should not be rushed; however, it is important that the process be made as efficient as possible to ensure the timely availability of new launch vehicles.

Orbital ATK is committed to supporting our nation's assured access to space policy. Reliable, affordable, and capable space launch systems are critical to ensuring our country is prepared to maintain access to space. Through the program outlined by the Air Force, we believe that industry is best able to respond to this need. Thank you Mr. Chairman, I look forward to your questions.